

**REDUCING THE BIOLOGICAL THREAT:
NEW THINKING, NEW APPROACHES**

Final Report

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EXECUTIVE SUMMARY

The security, scientific, technological, and political factors shaping the evolving environment within which the fight against biological weapons must be waged are creating a complex milieu that includes difficult barriers to building an effective response. Old ways of doing business, therefore, will not suffice. Creative, coherent, and collaborative approaches must be pursued. Developing a successful approach requires thinking differently about the problem. The challenge is not about arms control. In many ways, it is not even about weapons as we traditionally think about them. The biological security challenge is about the misuse of science and technology in a complex world whose hallmark is uncertainty about the future and the need to manage risks in the present. Confronting this challenge will not be easy, and it will not be successful overnight. Rather the elements of a new approach must be put into place now, doing the possible, building where appropriate on what already exists, and creating the partnerships among critical stakeholders whose involvement will be crucial for long-term success.

The report is divided into two sections. The first considers the current strategic and political environment that drives the need for new approaches to the biological security problem. The second section focuses on action, including some specific measures that might be pursued to reduce the threat of biological weapons. The measures identified here are not comprehensive. They are only a part of a fully strategic approach to biological threat reduction whose complete development awaits further work. At the same time, they represent an important starting point.

THE CURRENT ENVIRONMENT

The environment in the years ahead will be markedly different than today's and the thinking needed to deal with problems in that environment must respond to tomorrow's situation not yesterday's. Among the key factors shaping that evolving environment are the following:

The Evolving Threat

The biological weapons threat is not static, but constantly changing. It is shaped by a combination of factors, including actors' motivations, intentions, and capabilities, scientific and technological factors, and response capabilities. The following factors will need to be considered especially in seeking to identify next steps:

The Convergence of Terrorism and Proliferation

Since the attacks of September 11, 2001 the traditional U.S. approach of addressing terrorism and weapons of mass destruction proliferation as separate issues is no longer possible. The issues have become fused in the minds of the public and policy makers alike. Dealing with this complex problem poses a difficult challenge requiring a response that is both strategic in nature, and multifaceted in action.

An Apocalyptic or Asymmetric Threat?

The criteria for determining what makes biological weapons useful have changed during the last 30 years, and the United States has a different perspective of the biological weapons threat than others in the international community. A wide range of response capabilities will be necessary because the utility of biological weapons derives from a number of strategic roles they could play. Viewing the threat more in asymmetric than apocalyptic terms leads to an approach that emphasizes reducing the threat and managing the risks, creating proportionally greater attention to defense, protection, and preparedness.

Advancing Science and Technology

The rapid advances in science and biotechnology of recent years is a key reason that biological weapons will have to be dealt with uniquely. If anything the pace of advance is likely to accelerate, and it will have to be acknowledged that international treaties and agreements will only ever have limited utility in addressing such a fast changing scientific and technological landscape, which will continue to define and redefine weapons in this area. A key approach to this situation is to shift focus from “weapons” and instead look at behavior.

The Challenge of Infectious Diseases

In many cases it will be difficult to distinguish between a disease outbreak that is unusual, but natural, and the deliberate use of biological weapons. The infectious disease problem could be helpful in meeting the challenge of preparing for and responding to potential biological attacks, as many instruments for dealing with biological weapons and infectious disease are “dual-use”.

The Political Dimension

An overarching factor in the fight against biological weapons will be addressing the political dynamics between the United States and other countries. This is a fundamental barrier to potential cooperation between Washington and the international community.

How Serious is the Threat and What Do We Do About It?

Efforts of countries in Europe and elsewhere to deal with the biological challenge are considerably behind those in the United States. Differences exist about both the nature of the problem and what to do about it. The U.S. approach to states pursuing biological weapons programs, for example, has been to seek to isolate those states and impose costs on them. The Europeans, however, have favored engaging the countries of concern economically and diplomatically. This division in approach creates significant political barriers between the United States and its allies to potential new steps in the fight against biological weapons.

Another area of contention between the U.S. and other states is the role of arms control. The U.S. has adopted the notion over the years that arms control is one – and not the most important - “tool in the tool kit”. Other countries, however, have tended to place stronger emphasis on arms control as a principal means of solving the problem.

What U.S. Role? What Role for Others

The debate can be broadened to question what role the United States is expected to assume and what role the United States is actually willing to play in responding to the biological weapons threat. The view that Washington is solely concerned with its own agenda can best be described not in terms of “isolationism,” or “unilateralism,” but U.S. “exceptionalism,” described by Bush administration officials as “a uniquely American form of global engagement.” However, from elsewhere this is viewed as an unwillingness of the United States to be bound by rules that apply to others. Two particular concerns which have arisen from this approach:

- Washington’s preferred way to respond to a proliferation problem is military action, and
- Washington views the role of its allies as little more than endorsing the course of action it determines.

It is important to assess how these views will affect other countries regarding cooperation with Washington. Political differences between states will obviously make cooperation more difficult.

Two Politically Difficult Substantive Issues

Two other important issues that have emerged as challenges to seeking a global approach to the biological weapons problem are cooperation and assistance, and non-compliance.

- The problem of cooperation and assistance that has evolved over the past decade shows little evidence of being solved. The push of some non-aligned states to abolish the Australia Group is as strong as ever. More generally, non-aligned states seem determined to continue seek to trade off any support for harder security measures for cooperation and assistance in peaceful applications of the life sciences and biotechnology.
- Divisions over ensuring compliance and responding to noncompliance will be key to the long-term sustainability of arms control and nonproliferation agreements and the strength of the norms those agreements embody.

NEW THINKING AND NEW MEASURES

Advances of life sciences and the global diffusion of that knowledge has meant that the biological threat to public safety and security has become a potentiality that is likely never to be banished from the human experience. The challenge thus becomes “to keep it out of their (international actors) behavioral repertoires” by introducing new thinking and new measures. The first goal must be to shape the way people think about biological weapons so their use in the service of whatever cause will never resonate

positively. The aim would be eventually to reach the point at which not just the use of such weapons is deterred but their mere existence is completely delegitimized.

In order to adopt an all encompassing strategic response to this challenge it will be necessary to focus on deterrence, prevention, defense, and consequence management. Many activities are underway in each of these areas. What seems to be missing is a strategic framework to give them coherence. Therefore, the measures discussed here focus on activities to promote the new conceptual and policy environment that is needed to provide the foundation on which such activities can be developed, sustained, and effectively integrated.

Recommendations are highlighted in **bold**.

Building Intellectual Infrastructure – Creating Better Analytical Tools

No shared intellectual framework exists that provides a common basis for comprehending the challenge of biological weapons. Establishing such a framework will be important to address disputes about the nature of the challenge and priorities for dealing with it.

Threat Assessments

To build such an environment it will be necessary to work toward a shared appreciation of the problem, which does not exist at present. An important first step in achieving a new intellectual infrastructure environment will be **developing better threat assessments**. Single factor analyses, which characterize most discussions of the threat, are inadequate, as the biological threat is a product of complex interaction among several categories of factors, including actor, agent, target, and operational considerations.

Risk Assessments

Improving risk assessment will be another crucial step, focusing in particular on the balance between costs and benefits of particular problems and courses of action. The deliberate misuse of life sciences to spread disease is one end of a broad spectrum of risks that incorporates natural outbreaks of disease, accidents and misadventure, and deliberate use. Casting risks in terms of this full spectrum associated with the life sciences better reflects reality and creates a better means for identifying the critical cost-benefit tradeoffs associated with particular courses of action.

Scientific Assessments

Little agreement currently exists on the implications of advanced science and technology for today, let alone for the future. What little work has been done on this issue has focused primarily on how it can help the “bad guys,” and it has been conducted on a national, not international basis. There is little emphasis on looking a decade ahead to see capabilities that may become available and how they might be applied to reducing the BW threat. **Like-minded states should organize a working group of scientific experts charged with identifying the critical impact of science and technology on the future evolution of the biological security threat and potential response options. In essence,**

it should do a “net assessment” of the key scientific developments and most important new technologies. While most of the participants would be from developing countries, other key states that are taking a lead in biotechnology, such as India, Singapore, and Brazil, could be included, as could states whose involvement would be advantageous for political purposes, such as Argentina or South Africa.

Impact Assessments

A useful contribution to the intellectual infrastructure would come from elaboration of alternative measures of the impact of breaches of biological security. Developing such measures could contribute to a better, and more widely shared, view among policy makers of just how serious biological risks and threats are. They could also foster a better appreciation of the full range of how such capabilities could be used. In addition to **casualty rates** and **economic impact**, a particularly helpful metric would address **the psychological impact** of biological weapons threats and use under a variety of conditions.

Ethical Awareness

Because of the broader scope to biological security risks, however, ethical considerations in relation to the tradeoffs between security and other (especially humanitarian) priorities must be confronted.

Unlike nuclear scientists, members of the life sciences community have not focused on the security implications of the work they do. That must change, and it is beginning to do so. Codes of conduct, peer reviews and panels, and defining appropriate restrictions in scientific research are all ways in which the scientific community can contribute to an environment that does everything possible to foster the apposite use of the life sciences in the service of public safety and security. The more that is done by the scientific community in this area on an international basis, the richer that environment will be.

New Partnerships

In order to effectively develop an intellectual infrastructure to support a conceptual and policy environment stressing the proper use of life sciences, contributions will be required from a broader set of actors than those currently represented in the Geneva process or policy makers and bureaucrats in national capitals.

The Scientific Community

Active participation and leadership of the scientific community will be indispensable. By overcoming a traditional reluctance to conducting security-related life sciences research, scientists will be able to make valuable contributions to enhancing biological security both directly and indirectly.

Industry

Another key player is the **biotechnology and pharmaceutical industry**. The challenge to industry will be how to engage on issues of public safety and security to take

full account of legitimate security concerns without harming innovation and inhibiting efforts to exploit scientific and technological advances for their many benefits. **The growth of international biotechnology industry cooperation on matters of public safety and security must be encouraged.** This could be done through the establishment of a global enterprise that would link together biotechnology and pharmaceutical companies from around the world in a voluntary association that makes clear the advantages of national and international cooperation. Such an entity would make a particularly important contribution if it could become a forum at which government and industry participants examine their joint concerns relating to the public safety and security agenda and share ideas on the best ways to respond to those concerns.

Cooperation and Assistance

Export Controls

Australia Group members should conduct a future-oriented examination to identify how changing science and technology will influence export controls. Greater attention will need to be placed on what people are doing with the knowledge they acquire, especially in academic and industry settings.

Global Epidemiological Surveillance

There are a number of issues that will need to be considered in this area:

- **An inventory of existing disease surveillance capabilities will be a critical first step.**
- **Closer attention must also be given to developing a means to translate public health information into the security context in a useful manner.**

To enhance cooperation and assistance, **efforts will also need to be made to encourage the private sector to become more involved, and more assistance efforts might focus on the building capacity for bioterrorism preparedness and response.**

Responding to Noncompliance

The current confrontation with Iraq makes difficult any discussion of long-term, concrete approaches to dealing with noncompliance. The outcome of the crisis will have a dramatic impact on what may or may not be possible in response to future noncompliance. It remains to be seen whether a sufficient consensus can be forged in the UN Security Council on Iraq to suggest that any agreement is possible among Security Council members regarding broader nonproliferation and noncompliance concerns.

Finding ways to reduce ambiguity will be one of the most important tasks in the area of dealing with noncompliance, and also one of the most difficult. It may be that it is only with respect to a scenario involving BW use that there is a chance that the international community will act. How to effectively respond to noncompliance remains a question searching for an answer in a situation which previous answers – either “containment” or “engagement” – have not been successful.

I. INTRODUCTION

On July 25, 2001 the United States announced that it could not support the draft Protocol to the Biological Weapons Convention (BWC) negotiated by the Ad Hoc Group (AHG) of BWC states parties as presented in the “composite text” offered by the AHG Chairman. The U.S. statement made clear that further negotiation of specific language in the draft protocol would not address the major problems the United States had with the proposed text, which was seen to be based on a fundamentally flawed conceptual approach and unwarranted assumptions.

Five months later, in December 2001, the Fifth BWC Review Conference was suspended until November 2002 without completing a Final Declaration in light of a U.S. demand formally to bring the Ad Hoc Group process to an end, a move opposed by many other states parties at the meeting. This last-minute standoff was the culmination of three weeks of sometimes bitter disputes over how best to strengthen the BWC.

Between these two events, the United States was the victim of unprecedented anthrax attacks in the wake of the September 11 destruction of the World Trade Center. The anthrax attacks transformed what had been a theoretical concern for some people into a very real security threat for the entire country. In doing so, they created a fundamentally new context within which the challenge of biological weapons had to be addressed.

In the face of these developments, the question has been raised whether there is a future for biological arms control. With the protocol negotiations ended, the United States refusing to return to the old approach, and many countries angry at or dismayed with Washington for the way it handled both the protocol decision and the Review Conference, people are asking what, if anything, can and should be done.

This report seeks to contribute to providing an answer to that question. Its goal is to influence thinking in Washington and foreign capitals. The report’s concern in particular is the longer-term effort that will be needed to provide the foundation for sustainable efforts to address the multifaceted challenges posed by biological weapons.

Given this perspective, three assumptions that underlie this analysis must be identified at the outset because they are potentially controversial, especially outside the United States. First, the renewed Review Conference produced a minimal follow-on program comprised of annual meetings of states parties until the next review conference in 2006 and a small number of expert group meetings focused on narrow, well defined issues. None of these activities will have negotiating mandate, but will be more in the nature of information exchanges.

Second, this analysis is based on the view that the objective to which the international community should be committed is not the narrowly defined goal of

“strengthening the BWC.” The Biological Weapons Convention plays the critical role of concretely embodying the strong global norm against biological weapons. But it is not an end in itself. Rather, it is a tool – only one of many, and not always the most important – to be wielded to serve the more fundamental objective of dealing effectively with the threats posed by biological weapons, whether in the hands of states or terrorists. By clearly expressing that it is more important to focus on defeating the BW threat than strengthening the BWC, one is able to cast away the blinders that too often lead to defining a Geneva-based process related to the BWC as the only way to make political and diplomatic progress toward the fundamental goal.

This paper is not arguing that biological arms control should be totally abandoned. But it must be approached realistically. What can be achieved through a particular arms control agreement results from a combination of treaty language, the science and technology encompassed by the agreement, and international politics. That is why each agreement is unique and must be dealt with on its own terms. In the case of the BWC, the combination of treaty language that makes intent the key criterion for determining noncompliance, rapidly changing science and technology, and long-standing contentious political dynamics renders progress virtually impossible for the foreseeable future. Verifying the BWC may never be possible. Expecting otherwise and investing heavily in attempts to secure an outcome that promotes “verification” is probably not the best use of limited expertise, money, or diplomatic capital.

The challenge to arms control is made even greater by the emergence of related issues not necessarily foreseen by those who struck the agreement. The most obvious is the need to deal with the problem of non-state actors and the threat of terrorism. Although some BWC provisions could be relevant to the terrorist threat, such as its call for domestic measures that should include criminalization, the fact that the BWC was negotiated before bioterrorism became a real concern limits its utility in a world in which the problems of state-driven BW proliferation and bioterrorism have been fused into a single, but more complex challenge.

Similarly, integrating treaty compliance into a collective security architecture that must be responsive to the more complex realities of the post-Cold War world is proving difficult. Arms control compliance issues – e.g., in Iraq and North Korea – have risen to the top of the global security agenda. But they have done so in ways that create intricate linkages to other important security issues that make their solution more complicated. Because so many other issues will be affected by the outcomes of those situations, the “solutions” do not lie in the simple restoration of compliant behavior. Much more is now at stake. It is a burden that arms control alone was never intended to bear.

This does not mean that a Geneva forum is without value, but the benefits from continuing a process in Geneva will be more political than technical. A Geneva forum, for example, would probably involve states of BW proliferation concern, and their being at the table provides opportunities – if not for Washington, then for its friends and allies – to engage with them and keep the pressure on them. Political value accrues from keeping

the process going, even if the process itself is minimalist. It may, for example, contribute to political conditions that make it easier to achieve objectives outside Geneva.

The third assumption is related. This paper calls for fostering a conceptual and policy environment that stresses the use of the life sciences in the service of public safety and security. This line of thinking clearly represents a much broader context than a BWC-oriented focus for addressing the challenges of biological weapons proliferation and bioterrorism, one in which the BW challenge joins a wider array of problems associated with the conduct of responsible science and the proper use of related technology.

It may strike some observers that biological weapons represent a radically different challenge from issues relating to cloning, genetically modified food, and other questions about the proper use of the life sciences to promote public safety and security. But they share some characteristics at their core. First, public concerns about each of these issues are driven by the potential for the misuse of science and technology, whether deliberate or accidental. Second, the challenges are shaped by the need to respond to the incredibly rapid rate at which the relevant science and technology – in particular, the understanding of life processes at the molecular level – is advancing, a pace that is only likely to accelerate. Third, uncertainty as to where these scientific and technological advances will lead is a central element in all of these challenges. Properly understanding, accurately assessing, and effectively managing the risks created by this combination of factors is a central challenge in the years ahead.

This report is divided into two major sections. The first considers the current strategic and political environment that drives the need for new approaches to the biological weapons problem. The environment in the years ahead will be markedly different than today's and the thinking needed to deal with problems in that environment must respond to tomorrow's situation not yesterday's.

The second section of the report focuses on action, including some specific measures that might be pursued in the fight against biological weapons. In some cases, the proposed actions go beyond the boundaries of traditional arms control. In many ways, however, they are consistent with a view of arms control as a means for determining political relationships among critical international actors by shaping their thinking about the wherewithal by which the tools of violence, in this case biological weapons, could be developed or used. The measures identified here are not meant to constitute a comprehensive, fully strategic approach to biological threat reduction. They are only a part of such a strategy whose complete development and elaboration must await further work. At the same time, they represent an important starting point.

II. THE CURRENT ENVIRONMENT

The Evolving Threat

Shaped by a combination of actors' motivations, intentions, and capabilities, scientific and technological factors, and response capabilities, the biological weapons threat is not static, but constantly changing. As each of these factors changes, the risks associated with biological weapons evolve. The result is the need for a constantly adapting strategic approach that has as many outlets for addressing the problem as there are dimensions of the challenge. A number of aspects of the current and evolving threat are especially important when trying to identify next steps.

The Convergence of Terrorism and Proliferation

Traditionally, analysts have dealt with the challenge of BW proliferation by national governments and the problem of biological terrorism along separate tracks. This split approach prompted a focus on different strategies and different policy tools for dealing with what were considered distinct aspects of the problem, if not separate problems altogether. Such a separate approach in the world after September 11 will no longer suffice.

In essence, terrorism and proliferation of weapons of mass destruction have become fused in the minds of the public and policy makers. One can see this fusion in the rationales being offered on why action against Iraq is necessary. It is not just that Saddam Hussein has chemical, biological, or nuclear weapons programs, but that he is also an active supporter of terrorism. The argument is not necessarily that Saddam Hussein has provided NBC weapons to terrorists. There is no evidence, at least in the public record, that he has done so. The argument is that he might. And even if he does not, Baghdad's heavy involvement in both NBC weapons and terrorism is a dual indictment that demands action.

Nuclear, biological, and chemical weapons and terrorism are fused in other ways as well. The NBC threat (which includes radiological weapons as well, making them CBRN weapons), for example, is driving a significant portion of the budget and the programs tied to the U.S. homeland security effort, even though historically terrorist use of CBRN weapons is limited.

The fusion of concern over CBRN weapons and terrorism may not be analytically sound. Nor may it yield the best framework for developing effective policies. But it reflects a new reality created by the events of September 11 and their aftermath. It does capture the sense that those – state and non-state – who seek CBRN weapons, especially if they view the United States as an adversary, which most of them do, are using them as part of an asymmetric strategy ultimately to threaten perceived physical and psychological vulnerabilities of their enemies.

Confronting this complex challenge, the international community must implement a response that is strategic in nature and multifaceted in action. A range of tools must be exploited. Arms control is important in this context, but classic multilateral arms control (of the kind reflected in the draft BWC protocol) is unlikely to yield significant results on its own.¹ Nor does it provide a sufficiently wide perspective to facilitate all of the varied actions that will be required by all of the necessary actors – from both the public and private sectors – to deal effectively with the new realities that the convergence of state and non-state challenges present. What is needed is an approach that goes beyond the traditional modalities of arms control to new ways of thinking about how to reduce the threat of biological weapons, limit the risks to manageable proportions, and strengthen the norm against biological weapons that the Biological Weapons Convention embodies.

An Apocalyptic or Asymmetric Threat?

Considering biological weapons in the context of asymmetric efforts of state and non-state adversaries offers a second important insight into the current and evolving threat. In particular it suggests that the United States has a view of biological weapons that others may not share.

Much of the mainstream U.S. thinking about biological weapons is characterized by a number of myths.² One of those myths is that history “shows” that states are not much interested in biological weapons. This view is sharply at odds with reality, not of state use of biological weapons, but of the many national BW programs about which we already know a great deal, including those of the Soviet Union, Iraq, and South Africa.

A second myth is that biological weapons have little or no military utility. It may be true that because they are not immediate in their effect or are vulnerable to meteorological conditions biological weapons are not especially good battlefield weapons. But in today’s world, the battlefield is not necessarily where a conflict will be won or lost. As strategic weapons, biological weapons offer potentially high utility. This usefulness does not derive solely from the fact that, under some conditions, biological weapons could be roughly comparable to nuclear weapons in their mass casualty potential. That reality cannot be ignored. But biological weapons do not always have to be lethal to be highly effective. Use of biological weapons against ports of embarkation or debarkation that prohibits U.S. forces from deploying to a theater in the early stages of a conflict, for example, could buy an adversary time he needs to shape a political outcome. Biological attacks against agricultural targets could produce significant economic dislocation without killing many people. Nor should one forget the psychological impact of biological weapons attacks, even if fatalities are few. The

¹ “Classic multilateral arms control” is meant here to mean a process involving multiple countries (e.g., the states parties to an international agreement or the members of the Conference on Disarmament) intended to produce a legally binding treaty that constrains in some way something considered to be a weapon.

² This discussion is taken in part from Brad Roberts and Michael Moodie, “Biological Weapons: Toward a Threat Reduction Strategy,” *Defense Horizons*, No. 15, Center for Technology and National Security Policy, National Defense University, July 2002.

anthrax attacks in October 2001 killed five people, but their impact on the national psyche is hard to exaggerate.

This reality suggests that casualty levels – whether on the battlefield or in a civilian context – should not be the only metric for measuring the value of biological weapons, the severity of the threats they pose, the level of risk they create, or the extent of the impact they can have. Moreover, U.S. officials cannot fall victim to the trap of assessing the utility of biological weapons through the prism of its own program, which reached its zenith in the 1960s. The United States has not concentrated its undoubtedly impressive resources on the issue of maximizing the value of offensive biological weapons for more than 30 years. The criteria for determining what makes biological weapons useful have changed during those three decades. Especially for an adversary whose target is not U.S. forces or military capabilities, but America's will and power, biological weapons may seem particularly appealing.

In its response to the BW challenge, therefore, the United States cannot deal with biological weapons as if they were just another weapons system. This is another reason why arms control cannot be the primary means for addressing the biological weapons threat. Because the utility of biological weapons derives from a number of potential strategic roles they could play, a wide range of response capabilities is also necessary. Generating a sufficiently broad capability requires more players than would be involved in classic arms control and a larger number of policy options than arms control alone makes available.

An appreciation of the biological weapons threat that is more nuanced than a view dominated by concerns of apocalyptic casualty levels or lack of impact on the battlefield belies the view of biological weapons as amenable to approaches effectively applied in the past to other problematic weapons systems that created novel strategic challenges. In particular, the view that what worked for nuclear weapons during the Cold War can now be applied to the biological weapons challenge is wrong.

It is perhaps natural to hold a predisposition to deal with new problems by falling back on what we know, and what the United States knows is nuclear weapons. But an approach that worked for a problem based on physics does not translate well for dealing with challenges posed by the misuse of the life sciences. The biological weapons problem is not a derivative problem to which old nostrums can be applied.

One example is the emphasis placed on responding to the challenge of biological weapons through deterrence. Deterrence was a concept developed during the nuclear era to help manage a process, which, if it were to get out of control, could produce unprecedented levels of destruction. In the nuclear context it was well understood. But in terms of biological weapons, the concept is not so clear, not even about what one is trying to deter. Adversaries are either not identifiable or not familiar, especially in contrast to what we thought we knew about the Soviet leadership and how to shape its perceptions of the utility of nuclear weapons. Such uncertainties make it difficult to communicate a credible threat to the potential adversary – a requirement at the core of

effective deterrence. Deterrence, therefore, becomes a harder concept to apply in a BW context. These problems underline the fact that the unique challenge of biological weapons must be addressed on its own terms and within its own intellectual and conceptual framework.

The emphasis on dealing with biological weapons through deterrence not only exemplifies the propensity to look at new problems through the familiar prism of nuclear weapons, but it also shows how 50 years of nuclear-dominated approaches turned strategic thinking on its head. The Cold War was an historical anomaly. Reliance on deterrence was necessary during the U.S.-Soviet nuclear standoff because traditional means of dealing with military challenges – defense and protection – were not viable options to counter the marriage of nuclear and missile technology. Heavy reliance on deterrence as the primary means to deal with the biological weapons threat also suggests that those traditional means are insufficient for countering the BW threat. This thinking is reinforced by defining the BW problem primarily in terms of apocalyptic threats that are poised to strike at virtually unlimited national vulnerabilities.

People might argue whether this mindset constitutes yet a third myth about the BW threat. Whether it is or not, discounting traditional defense responses in favor of deterrence is a proposition that should be critically examined rather than accepted at face value. It is an important point to explore because if the future is characterized less by apocalyptic threats and more in terms of asymmetric ones, then defense and protection become more realistic options. This is true for both military forces confronting a BW-armed adversary and civilian bioterrorism preparedness efforts. In this view, threats can be reduced and risks diminished. This relationship between deterrence and defense in a biological context need significant further examination.

What is clear, however, is that arms control as a primary means of risk reduction runs up against limits, most notably the enormous difficulty of effectively verifying an arms control agreement in the biological realm. Such verification would require intrusiveness into civilian and military facilities well beyond what any country would be willing to accept and activities at a scale that create costs beyond what the international community would be willing to pay. These extremely difficult requirements derive from the second major defining characteristic of the evolving environment within which the fight against biological weapons will occur. This is discussed in the following section.

Advancing Science and Technology

The biological sciences and biotechnology have produced incredibly rapid scientific and technological advances in recent years, and, if anything, the pace of change is likely to accelerate. Classic arms control would have difficulty in capturing this dynamism and embedding it in an appropriate context. The BWC draft protocol, for example, was developed in light of what we know about the life sciences today. If it had been adopted, the relevance of its provisions for the science and technology of even a few years into the future is highly questionable. In essence, what needs to be recognized is the limited utility of treaty language addressing an area in which science and technology can

continue to define and redefine weapons. Language and meaning will never catch up to state-of-the-art science. What is needed, therefore, is a different approach, one that does not focus so much on “weapons” as on behavior.

It is not clear, for example, that the impact of advancing science and technology is adequately understood in evaluations of last October’s anthrax attacks and what they imply for combating the long-term biological weapons challenge. Much of the expert discussion of biological weapons that emerged in the wake of the attacks, at least in the United States, reflected the experience of those involved in the U.S. program of the 1950s and 1960s. The implication is that the way the United States did it at that time is the way in which it would be done today. In his book, *Biohazard*, however, Ken Alibek describes the illegal Soviet program as something quite different than the U.S. offensive program. Reports of the United Nations Special Commission on Iraq (UNSCOM) and other descriptions of the Iraqi biological weapons program delineate yet a different model. The South African program represented yet another distinct approach.

Each of these cases reflects a different situation based on the science and technology current at the time. As such, these experiences do not necessarily provide a particularly useful model for evaluating the challenge in the years ahead. Advancing science and technology will give new shape to the learning curve yet again. Much of the thinking that has defined the approach embodied in classic arms control, however, seems more attuned to dealing with these older programs than the novel approaches that states or non-state actors may be able to pursue in the future.

New scientific knowledge and technological capabilities will shape new scientific and business methods and practices far removed from those of today. Moreover, many of the breakthroughs in biological-related science and biotechnology are likely to be promoted, not by biology alone, but by combining biology with other technologies – for example, nano-technology, cutting-edge information technologies, and new materials science. Creative scientists and technologists could find new ways of putting such things together to advance BW capabilities. In essence, advancing science and technology will allow future proliferators to enter the BW game on a higher point on the learning curve.

Most of the advances in the relevant science and technology, and especially their commercial application, are being driven by the private sector. The relatively youthful biotechnology industry is growing rapidly. It is no longer simply the preserve of the medical sector and therapeutic drugs but rapidly extending into agriculture, the food industries, and many others. Its boundaries are constantly moving. The rapid evolution of the biotechnology industry is one of the major drivers raising public safety, security, and ethics issues among the public, including the future evolution of biological weapons.

At present the leading edge of the biotechnology industry is concentrated in relatively few countries. In terms of investment in research and development, the United States is by far the industry leader with over two-thirds in dollar terms; the next largest is the United Kingdom, followed by Japan, Germany, and Switzerland. However, the pace of biotechnology diffusion indicates that there will be many more players in the

biotechnology arena over the next decade. Major private biotechnology companies already have subsidiaries in many places around the world, and countries such as Singapore and India have not only publicly stated their objective to become regional biotechnology centers, but they have directed significant investments toward that goal.

Those involved in the biotechnology sector emphasize the contributions their rapidly advancing capabilities make to the improved quality of life for many people. Not everyone shares the view, however, of the biotechnology industry as an unalloyed good. Unscrupulous drug companies or other biotechnology enterprises, for example, have recently become the villains in popular novels and movies. The fact that advanced biotechnology is given a dark dimension in the popular culture captures a genuine sentiment among the public that, at the very least, reflects uncertainty and uneasiness with issues generated by the advancing life sciences and related technology.

The issues involved in what the *Economist* labeled “the politics of genes” are many and difficult, including cloning, gene patents, eugenics, genetically modified food, genetic testing, and privacy. It is into this environment – in which the public perception exists of industry “fiddling around with nature” (again to cite the *Economist*) – that the issue of biological weapons and the potential that advanced science and technology could contribute to a starker threat to public safety and security has been introduced.

These are obviously concerns for governments, which are struggling with whether there is a need for national and international regulation of the biotechnology industry in the face of such issues. Government bureaucracies are notoriously slow to adapt. International organizations are no less so. Confronting the incredibly rapid pace of change in the world of biology, one must ask whether and how the international community will be able to keep up. The vastly different rates at which science will move forward and governments can adapt require a broader approach that facilitates an ongoing appreciation of the evolving scientific and technological landscape in as close to real-time as possible. To facilitate such a process, governments must establish a new and different kind of working relationship with industry on these issues.

At the same time, as the driver of much of the critical science and technology, industry must understand its stakes in the challenge and be fully integrated into the necessary strategic response. Given the growing public and governmental concerns over developments in biotechnology, it would also be very much in the interests of the biotechnology industry to cooperate in promoting proper, safe, and ethical business practices and facilities around the world. Such cooperation would yield several important benefits. One, it would alleviate public anxiety about the direction and practices of the industry. Two, it would help ensure that industry is fully aware of global developments in national and international legal measures and regulation. Three, it would facilitate progress on issues of common concern on a global basis, including those related to national security, and to biological weapons in particular. Four, it would help to ensure that governments take industry concerns fully into account in the development of their regulations relating to the industry and other measures that may impact directly and significantly on the industry’s future.

Looking to the future, there is little to suggest that industry would change its approach if another BWC protocol-style effort were put forward as the means by which to achieve these benefits. Something different is needed. Addressing the issues in the broader context of enhancing public safety and security could be a much more appealing context within which the necessary long-term bridges between government and industry are constructed.

The Challenge of Infectious Disease

A third important factor shaping the evolving security environment is emerging and re-emerging infectious diseases. A warning of the impact of disease on U.S. national security was sounded by the 2000 National Intelligence Estimate (NIE), *The Global Infectious Disease Threat and Its Implications for the United States*. This unclassified report stressed, in particular, that infectious diseases will endanger U.S. citizens at home and abroad, threaten U.S. forces deployed overseas, and exacerbate social and political instability in key countries and regions in which the United States has significant interests.

Globally, infectious diseases are the second leading cause of death overall and the primary cause of premature death. According to the World Health Organization (WHO), half of the world's population is threatened by endemic diseases. In 1998, for example, infectious diseases were the leading cause of mortality in low-income nations in southeast Asia and Africa. Many of the diseases that are life-threatening in the developing world, however, have a negligible public health impact in most developed countries, setting the stage for political differences between rich and poor countries over global priorities.

Exacerbating the situation is the fact that infectious diseases are now becoming resistant to antibiotics, further reducing the tools available to deal with them. In addition, over the past 20 years, more than 30 new infectious diseases have emerged to threaten human health, including Ebola, Legionnaires' disease, cryptosporidium, and hanta virus. Moreover, although the greatest impact of infectious diseases is felt in the developing world, with travel and trade making the world more inter-connected, no region or country of the world is immune. "Airport malaria," for example, is an increasing phenomenon as mosquitoes carrying the disease disembark with passengers.

The growing global problem of infectious disease creates a troublesome backdrop against which the biological weapons threat must be addressed. For much of the world, endemic, naturally occurring diseases are a more real and immediate threat, and hence a higher priority, than biological weapons. In many cases, it is likely that it will be difficult to distinguish between an outbreak that may be unusual, but is nevertheless natural, and one that results from the deliberate use of biological weapons. Much of the work done in the biological sciences is intended to ameliorate global health challenges, but the resulting knowledge could be modified for malevolent purposes and applied to improving biological weapons capabilities. This connection stresses yet again the reality that biological weapons cannot be managed as just another weapons system.

Tackling the BW challenge in the context of the infectious disease problem, however, also provides opportunities and reinforces the value of looking at the issue in broad terms. Many of the instruments for dealing with biological weapons and infectious disease are “dual use.” As a result, looking at how to improve capabilities for dealing with infectious diseases could provide new avenues for addressing the biological weapons menace. Advances in detection and identification of diseases is an obviously important step in each area. Bolstering response capabilities for one purpose will help with the other. New treatments and medicines could pave the way for additional breakthroughs. The complexity created by the linkages between infectious disease and biological weapons, therefore, is not necessarily just a negative aspect of the emerging environment.

The Political Dimension

The evolving strategic environment within which the fight to reduce the threat of biological weapons will be shaped in important ways by the political dynamics between the United States and many other countries -- friends and allies, other major powers including Russia and China, and important states of the non-aligned movement (NAM). A number of countries were upset with Washington for its decision to reject the draft protocol and to call at the Review Conference for a formal end to the Ad Hoc Group. Not all other countries share the U.S. view of the immediacy and seriousness of the biological weapons threat. Others worry about what they see as a U.S. willingness either to “go it alone” in responding to the threat or to emphasize measures and forums that reduce their leverage as players on the issue. Still others, especially in the developing world, continue to emphasize securing access to the relevant science and technology – presumably for peaceful purposes – without, in Washington’s view, a commensurate recognition of the salience for them of the biological weapons problem. Given these political differences, it is difficult to see how any BWC protocol by itself is sufficient to address legitimate security concerns.

Following the limited outcome of the Review Conference, how these political dynamics will interact with the other important elements of the environment discussed above could set the limits as to what can be accomplished in the next several months or even years in the fight against biological weapons. They will help determine whether the alternative, broader approach advocated in this report is viable. It is, therefore, important to review these political dynamics briefly to attempt to determine how they might play out and influence prospects for progress.

How Serious is the Threat and What Do We Do About It?

Before last October’s anthrax attacks, many U.S. friends and allies implied that Washington was “hyping” the bioterrorism threat. In their view, shared by some in the United States, the historical record did not justify the level of concern the United States was exhibiting. Tough technical issues remained that were difficult for non-state actors to overcome (although it was acknowledged that advancing science and technology was

making some problems easier). Outcomes of BW use were too uncertain to make them preferable to the predictable impact of traditional terrorist weapons of guns and bombs. Moreover, many friends and allies have had a long experience with terrorism to which they saw the United States just waking up. They exuded a confidence based on their record in dealing with terrorism, albeit one that did not include incidents involving BW or other weapons of mass destruction.

As a result of these views, many U.S. friends and allies seemed to consider the investment the United States was making in bioterrorism preparedness efforts excessive and not something they had to match. While they were willing to take some steps, especially in “dual use” areas such as public health and law enforcement, efforts of countries in Europe and elsewhere directed toward the bioterrorism problem lagged well behind those of the United States.

Despite the anthrax attacks, this view among U.S. friends and allies of the limited nature of the bioterrorism threat has not significantly changed. Their reaction to those attacks seems almost as if they would be relieved if the perpetrator was found to be “homegrown” rather than a member of a transnational non-U.S group because such an outcome would not undermine their view that international terrorists do not find biological weapons especially attractive. A homegrown anthrax user would only reinforce their sense of American singularity when it comes to violence; in doing so, it would also bolster the notion that bioterrorism is not a major global security challenge, at least to the extent portrayed by the United States.

Such differences have implications that could color broader political interactions. In NATO, for example, allies have been reasonably successful in implementing a work plan for protecting alliance military forces, while their civilian counterparts have been frustratingly slow in achieving similar progress for the civilian side.

U.S. friends and allies deem the state BW proliferation problem more serious. With Washington, they recognize the dangers inherent in spreading biological weapons capabilities. Even so, differences have emerged between Washington and other capitals, not so much on the nature of the problem, but on what to do about it. Those differences are especially marked over how much engagement there should be with countries of concern, and the role of arms control in managing the BW proliferation problem.

Washington has generally attempted to isolate countries with biological (and chemical and nuclear) weapons programs, and to impose costs – through sanctions, for example – in order to change their behavior. Some U.S. friends and allies, however, find such an approach too punitive and without sufficient leverage to accomplish the desired goal of turning states away from proliferation. They point with considerable justification to the sparse results the U.S. approach has yielded in terms of forcing states of concern to alter their behavior or relinquish their CBRN programs. They also note that despite its claims, Washington provides precious little evidence to convince skeptics that its allegations about particular countries have merit.

A better approach, the Europeans contend, is not to isolate the country in question but to engage it, and to demonstrate the benefits that derive from halting its proliferation efforts. Most often that engagement is cast in economic and political terms, but it can sometimes have a security component. A number of European Union members, for example, conduct security oriented consultations on a regular basis with Iran, a country the Bush administration made a charter member of the “axis of evil” for its proliferation activities and support of terrorism.

The European argument leaves them open to cynical characterizations of their approach as deriving more from commercial interests than from an interest in halting proliferation. Indeed, the Europeans also have little to show in security terms from their engagement with the most notorious countries of concern – Iraq and Iran, but also North Korea with whom some European nations have established diplomatic relations – who continue their proliferation efforts largely unabated. It is hard for the Europeans to point to concrete examples of ways in which their engagement has paid off. This should not be surprising since the countries in question totally deny they are pursuing biological weapons or other weapons of mass destruction, so they are not in a position to give the Europeans any satisfaction.

The question of engagement with countries of concern not only creates differences between the United States and its European allies, but also between Washington and other important international actors, especially Russia and China. Moscow is open about its economic interest in dealing with proliferant countries. Iran is an especially important source of hard currency for transactions that have potentially significant proliferation repercussions such as Russian assistance in building the Bushehr nuclear reactor. China’s motivations are more complicated, deriving from a mix of political, economic, and security incentives. Whatever the reason, the lack of agreement on the importance and value of interaction with countries of proliferation concern creates significant political barriers to potential new steps in the fight against biological weapons.

A second difference between the United States and Europe on how to deal with the BW proliferation problem relates to the role of arms control. The United States tends to assess the value of arms control and the contribution of instruments such as the BWC in terms that relate them to other “tools in the tool kit,” including intelligence, diplomacy, passive and active defenses, military options, and export controls. Arms control is appreciated for its contribution, but its limitations are also recognized. Maximizing its potential is seen to derive from making it work together effectively with other policy tools. In addition, particularly in the current administration, people in the United States argue that because they have more at stake in global terms because of the world role the country has to play, Washington must ask more of arms control agreements than others whose interests are perhaps less significant.

In contrast (and to overstate for emphasis), the U.S. view is that some friends and allies, including many in Europe, have never seen an arms control treaty they haven’t liked, even if it contributes little of genuine significance to security. Indeed, some countries tend to give pride of place in the tool kit to arms control. Some even view arms

control as an alternative to other policy tools rather than as a complement to them. The result is that some U.S. friends and allies rely more heavily on the contribution of arms control in dealing with the problem of proliferation than does Washington. These differences must be recognized and reconciled if efforts to respond effectively to the BW challenge ultimately are to be successful.

What U.S. Role? What Role for Others?

The current debate about how the United States exercises its power in a period in which it enjoys unprecedented global dominance obviously has implications for the narrower issue of what to do about biological weapons. Political dynamics in this area as they pertain to the BW problem derive from the interaction of a number of concerns, including worry about a U.S. propensity to “go it alone” in dealing with the proliferation problem, differences over the value of existing forums for developing effective approaches, and perceptions of a greater U.S. priority to national than international programs. It is too simplistic to cast the issue in terms of the dichotomies between isolationism vs. global engagement or unilateralism vs. multilateralism. It may have more to do with the sense of U.S. “exceptionalism,” which for the United States is seen to be strongly positive. Bush administration officials have described it as a “uniquely American” form of global engagement. For those outside the United States, however, this sense of exceptionalism is seen as an unwillingness to be bound by rules applied to others, whether it is in the environmental arena (e.g., the Kyoto Protocol), the legal realm (the International Criminal Court), or arms control (the Comprehensive Test Ban Treaty and the BWC protocol).

There is, however, more than a bit of disingenuousness in this attitude. Countries seem to want U.S. leadership only if Washington pursues a course of action with which they themselves agree and on which they do not wish to extend political capital. If the United States exerts leadership along an unexpected or different line, it then is almost automatically labeled “unilateralist.” They cannot have it both ways.

The debate prompted by the prospect of U.S. military action against Iraq highlights two major concerns about Washington’s preferred way of dealing with the proliferation problem. The first is the worry that the Bush administration views military action as its preferred and, hence, first option, rather than as a response of last resort. This is an inaccurate view, of course, in light of the fact that the administration has not taken precipitate action against Baghdad and accepted arguments calling for consulting with Congress and allies, making a public case to the people of the United States and abroad, and exploring non-military options, especially through the United Nations. Some people view the administration’s efforts in this regard as just “checking the boxes” with little commitment to making alternatives to the military option work. These views could also reflect a genuine difference in perception on how confident one should be in the viability of those non-military options. Regardless, the administration’s refusal to rule out use of the military to secure the goal of regime change in Iraq continues to be the source of considerable consternation.

The second concern relates to Washington's view of the role of its allies, which in their view is little more than to endorse whatever course of action Washington determines. They see two lines coming from Washington: the "you're either with us or against us" mentality and a "thanks for your offers of help, but don't call us, we'll call you" attitude. Both relegate allies to the sidelines, only to be sent into the game by the coach when the outcome has already been determined.

In the BW context, this prism has been applied especially to how the United States has handled the Review Conference. Many countries, including friends and allies, did not like the U.S. decision not to support the draft protocol, but at least the United States had substantive arguments for its decisions, albeit ones with which they disagreed. The Review Conference, however, is a procedural issue, and Washington is seen as insisting on having its own way as to how things will be done as well as on what will be done. U.S. lack of enthusiasm for follow-on mechanisms until the next review conference (scheduled for 2006) is seen to show that the administration cares only for its own issues and has little interest in or time for those of others.

Looking forward, the critical question is how these views will influence the willingness of other countries to cooperate with the United States when Washington seeks such cooperation. To date, U.S. officials have indicated that despite the disputes in Geneva, other countries have been quite willing, if not eager, to work together in a variety of ways. They cite as examples recent decisions by the 33-member Australia Group to expand its regulations on exports of biological-related materials and equipment and the instigation by the G-7 (and Mexico) Group of Health Ministers of a joint bioterrorism action plan. These initiatives have moved forward even while some countries who are participating in them decry U.S. policy in Geneva regarding the BWC Protocol, the future of the Ad Hoc Group, and the Review Conference.

Some of the dismay about Geneva derives from the view that prevails outside Washington about the "Geneva process" itself. Many countries place importance on what happens in Geneva because it, like a wider range of UN-related activities, embodies the notion that the world is moving toward a system in which agreed rules that all countries have had a hand in making apply equally to everyone. By rejecting the results of such a process (i.e., the draft protocol) and to an extent the process itself (i.e., in preferring few, extremely limited, if any follow-on activities, let alone negotiations), the United States is also seen to be rejecting such a system by which it would be bound, another manifestation of U.S. exceptionalism.

A related view holds that the Geneva process that brings together all states parties to the BWC and the competing priorities they hold is the only way to make meaningful diplomatic and political progress on the BW challenge. To some extent this view is another reflection of the attitudes mentioned earlier on the importance of arms control, but it is more than that. It also stems from this sense that all countries – or at least all those party to the BWC – should have some say in the future "rules of the road."

Denying them this opportunity makes it more difficult to put into place an approach that will generate widespread and sustained support.

Shutting down the Geneva process, of course, also denies some states the opportunity to exert any leverage they might have. This is particularly true for those non-aligned countries whose greatest interest is expanding their access to biological-related materials and equipment through assistance and cooperative measures. With no forum, they have no means to link their demands to the goals of others, especially their support of more security-oriented measures, thereby eliminating their leverage. The negative impact of losing the forum, however, goes beyond that group of non-aligned states to those countries whose best opportunity to play a meaningful role in this area is provided by such forums. Countries such as Australia, South Africa, and even some European states are respected diplomatic “players” in these forums, often because they attempt to find compromises between extremes where one, it must be admitted, sometimes finds the United States. This role gives them leverage both to pursue their own substantive agenda and to push the United States in particular directions, which they lose with no forum in session.

A further political concern about Washington’s approach to the BW threat relates to the perception that the Bush administration places undue priority on the security of the U.S. homeland to the detriment of international security. In particular, other actors see Washington’s emphasis on biodefense and public health as manifestations of a “U.S.-first” approach that does not fulfill America’s obligations to lead global security enhancements. The questions that have been raised about how close some biodefense programs have come to the line of noncompliance with the BWC – with some people arguing that, in fact, that line was crossed – are another example of the worry that the United States sees itself as exceptional and arrogates to itself the right to conduct activities which Washington would find questionable if not illegal if others did the same things, all in the name of meeting the unparalleled obligation of protecting the American people. The amount of money the United States has invested in enhancing public health capabilities in contrast to its investment in global public health is noted as another indication of an imbalance in Washington’s national and international priorities.

These political differences clearly do not make cooperation on the BW impossible, but they do make it more difficult, especially in the long-term, as these dynamics will be shaped by broader political interactions, such as those that will occur over the future of Iraq. Together, these factors suggest an uncertainty over U.S. leadership that will make friends and allies skeptical of the broader approach promoted in this report. These difficulties are not insurmountable, but they do require from Washington deftness in its political and diplomatic efforts that has not always been evident.

Two Politically Difficult Substantive Issues

Two important political issues related to the biological challenge have plagued efforts to develop a more effective global approach to the problem. The first is the issue of cooperation and assistance. The second focuses on noncompliance.

Article X of the BWC obliges states parties to “facilitate...the fullest possible exchange of equipment, materials, and scientific and technological information” for peaceful purposes and to “cooperate in contributing with other states ...to the further development or application of scientific discoveries in the field of bacteriology (biology) for prevention of disease, or for other peaceful purposes.” This obligation, which is similar to provisions in other arms control and nonproliferation agreements such as the Chemical Weapons Convention and the Nuclear Nonproliferation Treaty, has been highly politicized in the last decade. Disputes over cooperation and assistance, and in particular over export controls, have become a *leitmotif* in BWC venues.

Cooperation and assistance have been of special interest to non-aligned states who have been unapologetic in arguing that for them these were the major benefits from joining the regime. In their view, cooperation and assistance is a mainstay of the convention, and many see those provisions as more significant than those addressing security. Furthermore, a group of more radical NAM states, including Iran, Cuba, India, Pakistan, and others, has linked the cooperation and assistance arguments to their interest in eliminating the Australia Group which they see as a discriminatory mechanism of developed countries designed to limit their access to advanced science and technology. The fact that some members of this radical group are also identified as countries of concern regarding biological weapons proliferation suggests that some of them have other motives in seeking to do away with the Australia Group’s export controls.

During the protocol negotiations, this radical group demanded that Australia Group members commit themselves to disbanding, a demand that was promptly and consistently rejected. They then called for the right to have Australia Group denial decisions reviewed by a BWC-related body with the view to overturning those decisions. That demand, too, was rejected. Australia Group members argued that Article III of the BWC also imposes the obligation not to transfer materials and equipment that facilitate development of an offensive biological weapons program. In the absence of any other effective export control mechanism, Australia Group members contended they have the right to meet those obligations as they see fit.

The discussions during the protocol negotiations were only the latest round in a dispute that has persisted for more than a decade, and one should anticipate that non-aligned states will continue to link their support for harder security measures to greater cooperation and assistance in peaceful applications of the life sciences and biotechnology. Breaking that linkage is important to future success of anti-BW efforts,

but it is not likely to happen unless an approach can be found that gives non-aligned BWC states parties something. Doing so would have the additional benefit of stripping the cover behind which the more radical NAM states are hiding, isolating them, and reducing their ability to throw up roadblocks to progress. The broader approach suggested in this report has the ability to break the linkage that states have been able to draw in the Geneva process while, at the same time, actually delivering benefits. This argument is further elaborated in the discussion of measures that follow.

A second substantive issue that provokes strong political responses is noncompliance. The United States did everyone a favor by laying this problem squarely on the table at the opening plenary of the Review Conference when Undersecretary of State John Bolton “named names” and argued that Iraq, North Korea, Iran, Libya, Syria, and Sudan had offensive biological weapons programs. This blunt approach offended many other participants at the Review Conference. They were not so outraged by the naming of names, because that had been done before; the United States and the United Kingdom had explicitly accused the Soviet Union of violating the BWC at the 1991 Third Review Conference. Rather, Washington was seen as hypocritical in identifying only some states that are deemed to be developing biological weapons but not others such as Russia, China, and Israel, about whom concerns also exist but which political interests would keep Washington from listing explicitly.

Although its tactics can be debated, the United States made a valuable contribution at the Review Conference by putting the issue of noncompliance front and center. For too long, countries have been unwilling to engage on this tough issue. The reasons for this are many, and some of them are good, but not all of them. One view holds that some states are willing to duck the question of noncompliance because acknowledging that another state was not meeting its treaty obligations would require a response. This is a responsibility that many states would prefer to avoid either because they have an agenda with the state in question and action on noncompliance would jeopardize other interests, or because they do not have the will or resources to anything about it. Yet, ensuring compliance and responding to noncompliance is central to the long-term sustainability of arms control and nonproliferation agreements and to the strength of the norms those agreements embody. Refusing to acknowledge legitimate BWC noncompliance issues raised by the United States and an unwillingness or inability to deal with them meaningfully will do more than virtually anything else to erode the norm against biological weapons. While some people will argue that the protocol was intended to be major step toward dealing with compliance issues, its shortcomings – and even its supporters said its contributions would be modest at best – did not make it a truly meaningful step forward. Certainly, the reactions of those participants at the Review Conference who were upset by the U.S. effort to get them to focus seriously on the noncompliance issue raise questions as to what they really thought they were doing in pursuing the protocol.

III. NEW THINKING AND NEW MEASURES

Because of the advances in the life sciences and the global diffusion of that knowledge, the biological threat to public safety and security has become a potentiality that can never be banished from the human experience. The challenge, therefore, as UK Ministry of Defence official Paul Schulte put it, is not to prevent the entry of the technical capacity to pose a biological threat into the capabilities of international actors – state and non-state. That is not possible. Rather, it is “to keep it out of their behavioral repertoires.” According to Schulte, a willingness to pursue biological weapons is more likely if there is a “transformative event,” one in which biological weapons are used to good effect, i.e., to produce significant casualties in the service of what a significant proportion of the world’s population deems to be a legitimate, even noble cause. Such a demonstration of the utility of biological weapons in support of a “legitimate” cause would almost certainly become an argument for legitimization of the instrument itself.

The first order requirement that flows from casting the biological security challenge in this way is to shape the way people think about biological weapons so that their use in the service of whatever cause never resonates positively. Some people might suggest that stating the requirement this way is tantamount to arguing for deterrence of biological weapons use. Deterrence is necessary, but not sufficient. The goal is not just to deter BW use, but to delegitimize the weapons themselves. Delegitimization makes it hard to invoke any cause as justification for resorting to such an abhorrent option. Some people might argue that the global norm against biological weapons embodied in the BWC already reflects delegitimization. The fact that some states and terrorists continue to seek a BW capability suggests that delegitimization has not gone as far or as deep as it should.

Second, while deterrence has to be among the means for addressing the BW problem, it may be neither the most important nor the most effective. Schulte has listed at least six other tasks that also must be undertaken to promote biological security: dissuasion, disarmament, denial, disruption, detection, and defense.³ A less granular definition of the required tasks suggests the following response spectrum:

Strategic Response to the BW Challenge

Deterrence → Prevention → Defense → Consequence Management

Many activities are underway in each of these areas. But what seems to be missing is a strategic framework to give them coherence. For this reason, the measures discussed here will focus on activities to promote the new conceptual and policy environment that is needed to provide the foundation on which such activities can be developed, sustained, and effectively integrated. Creating this environment is as

³ Paul Schulte, “Bioterrorism: From Theory to Reality – Seven Responses and a Sense of Proportion,” in *Implications of 9/11 on National Security and the Path Forward to Peace*, Conference Proceedings, Twelfth International Arms Control Conference, Sandia National Laboratory, pp. 161-168. This formulation has the additional value of embedding arms control and nonproliferation efforts in a framework that neither dismisses nor exaggerates their importance.

important as promoting individual actions because the environment will reflect the extent to which the goal of deligitimization has been achieved.

A new conceptual and policy environment will include a number of elements that currently do not exist. These include:

- ↑ An intellectual infrastructure relating to biological security;
- ↑ New partnerships among a wider range of actors with important stakes in a successful effort to meet the biological security challenge;
- ↑ A coherent approach to international cooperation and assistance in the life sciences; and
- ↑ A realistic set of expectations regarding compliance and responses to noncompliance.

Facilitating the emergence of these elements should become as important in the U.S. approach to confronting the biological challenge as investing in new technologies, enhancing BW-related intelligence capabilities, enlarging public health capacity, or pursuing arms control and nonproliferation agreements. Indeed, if a new environment can be created, these other measures will achieve greater effect. Measures to promote these environmental elements are discussed below.

Building Intellectual Infrastructure – Creating Better Analytical Tools

There is no intellectual infrastructure that provides a common framework for understanding the biological challenge similar to the one that evolved with respect to nuclear weapons in the second half of the 20th century. Such an infrastructure should be promoted to provide a means to address disputes about the nature of the challenge and priorities for dealing with it. In and of itself, such a framework will not generate answers, but the development of reasonable policy must begin with shared understandings, a common language, and useful conceptual tools policy makers.

The task confronting those who must elaborate this intellectual infrastructure for biological security is not the same one undertaken by their nuclear counterparts fifty years ago. Although the mere existence of nuclear weapons was unacceptable to some people, the conceptual foundation that shaped thinking about nuclear weapons was premised on acceptance of some role for such weapons. Much of the subsequent elaboration had to do with the goals, means, and limits of that role. With respect to biological weapons, their use is never legitimate; they have no role.⁴

⁴ A debate is currently underway regarding the legitimacy of some specific types of weapons that may rely on biological principles, that is, non-lethal weapons. This is a complex debate that entails legal, political, military, counterterrorism, humanitarian, and other interests. It will be some time before this debate is concluded. One obvious factor on which it will turn is the “non-lethal” aspects of such capabilities, and what that would mean in a range of different situation. The question of how to incorporate the non-lethal weapons issue into the new conceptual framework recommended here requires further examination.

Threat Assessments

Building a biological intellectual infrastructure must begin with a shared appreciation of the problem. Today, a common view of the threat does not exist. Are biological weapons strategic or tactical? What is their military utility – on the battlefield, against operational in-theater targets, against an adversary's home base? Do states or terrorists pose the greater threat? Is such a dichotomy even useful, or does the relationship of the state and non-state dimensions of the problem require recasting how we think about both? What are the best ways to classify the critical components of an effective response? How are those components related and how do they interact? These are only some of the questions about the biological challenge on which it would be hard to find agreement within the small biological "security community," let alone a shared set of concepts or common language for addressing them.

The first requirement, then, for establishing an intellectual infrastructure to support biological security must be better threat assessments. Such assessments today often explain the threat in terms of a single factor such as the agent (whose potential lethality is emphasized in most vulnerability assessments), or the actor seeking to use biological weapons (which historical assessments, for example, usually stress). Single factor analyses are inadequate. The biological threat is the product of a complex interaction among several categories of factors – actors, agents, targets, operational considerations – each of which includes many variables. Taken together, these variables can produce a large set of combinations and permutations. Some of these combinations would yield significant results and some would not. Examining these many variables together and integrating their interaction into a meaningful analysis is not easy. Better threat assessment methodologies, therefore, should be one of the building blocks of this intellectual infrastructure and a valuable tool to promote more agreement on the nature of the challenge.

Risk Assessment

Threat is not the same as risk, however, and better risk assessments are as badly needed as better threat assessments. In this view, the biological weapons challenge – the deliberate misuse of the life sciences to spread disease – should be seen as one end of a spectrum of risks associated with the life sciences that begins with natural developments such as the outbreak of disease, and runs through accidents and "misadventure," i.e., the unforeseen negative consequences of what are otherwise beneficial activities (such as medical research), to deliberate use on the other end. Public safety and security risks emanating from developments in the life sciences are converging. Those who have had to be concerned about natural or accidental risk – industry, scientific researchers, and others – traditionally have cast their requirements in terms of safety. Those whose focus is deliberate misuse applied a security perspective. Today, the growing realization of the links between infectious disease and biological weapons or the potential implications of scientific research (advanced genomics, for example) for shaping the biological weapons problem are examples of the many reasons why it is more difficult to draw a clear dividing line between safety and security risks.

Casting risks associated with the life sciences across the full spectrum from those that occur naturally to those that are the result of deliberate human choice not only better reflects reality, but it also creates a means for identifying the critical cost-benefit tradeoffs associated with particular courses of action.

Cost-benefit analysis is a crucial part of the risk assessment process. Considering the full risk spectrum facilitates an appreciation of costs and benefits in a way that doing threat assessments does not. A cost-benefit analysis of applying strict regulations to the publication of contentious research, for example, might deem such limitations sensible if one were only concerned about the security implications of such research. But when the broader spectrum of affected activities is considered, including the need for sharing knowledge generated by new research for medical, commercial, or other legitimate reasons, the cost-benefit calculation is likely to yield a different policy outcome. Similarly, some actions that would be reasonable if biological security considerations are not included become more problematic when they are added. Developing new agent production technologies to make agents more efficiently, for example, could reduce business costs to biotechnology companies. But they might also help overcome technical difficulties in producing high quality agent for weapons use. Incorporation of security concerns into risk assessments is especially important when considering the unintended consequences of otherwise positive activities.

Scientific Assessments

Little agreement exists on the implications of advanced science and technology for today, let alone for the future. Some scientists, for example, argue that what we already know about the human genome is enough to make possible weapons that are effective against one ethnic group but would have little impact on another. Others discount this possibility. Still others take a middle course that suggests that a weapon is possible that could have a proportionally greater impact on one ethnic group than another but that all would be affected to some extent.

A number of eminent scientists have participated in evaluations of the impact of advancing science and technology on biological security in the years ahead. For the most part, however, these have been national rather than international efforts. Moreover, such studies have tended to focus only on the negative impact of new science and technology. The 1999 report from the British Medical Association (BMA), *Biotechnology, Weapons, and Humanity*, acknowledges, for example, that while the more benign impact on the evolution of protection and defenses should be kept in mind, the report's purpose is to examine "the impact of modern biotechnology on the evolution of the threat." It then goes on to discuss in detail the impact of new technologies on such questions as enhancing BW production capabilities, new agents that might be used for BW, and the prospect of tailoring microorganisms for BW purposes.

An even more detailed assessment of the negative impact of the latest developments in biotechnology was conducted in a 1997 summer study by the JASONs, an organization of primarily academic scientists who address problems of national

interest.⁵ Stephen Block, a participant in the study, summarizes its conclusion as follows:

[P]rogress in biomedical science inevitably has a dark side, and potentiates the development of an entirely new class of weapon of mass destruction: genetically-engineered pathogens. The danger of such next-generation biological weapons in the 21st century is quite real, and they pose extraordinary challenges for detection, mitigation, and remediation.

Looking only at the implications of biology and biotechnology on weapons development, however, is not the whole story. Block notes, for example, that “the one saving grace of this whole gloomy scenario may be that the very same technologies that make possible biological weapons may make it possible to defeat them.” Indeed, biology and biotechnology are critical components of an effective response to the biological challenge. Discussion of these positive developments, however, particularly among non-scientists, is rare. Someone interested must look at the details in such publications as the Department of Defense’s *Annual Report to the Congress* on nuclear, biological, and chemical defense which details current DoD research and development (and other) programs to address medical and non-medical biological defense programs. The problem with such reports, of course, is that they focus on current programs involving technology already developed. There is little if any emphasis on looking a decade ahead to see what capabilities may be available and how they might be applied to reducing the BW threat.

As a result of this lack of discussion, awareness beyond the scientific community – or the responsible program manager – is not widespread, particularly at the policy making level or among the broader policy community concerned about BW. Certainly the public is not aware of them; a microbiologist working on detection of a wide spectrum of biological agents is hardly the stuff from which to fashion the hero of a best-selling thriller.

An international mechanism at the official level is necessary to facilitate understanding of the full impact of advancing science and technology. In particular, **like-minded states should organize a working group of scientific experts charged with identifying the critical impact of science and technology on the future evolution of the biological security threat and potential response options. In essence, it should do a “net assessment” of the key scientific developments and most important new technologies.**

A similar idea was offered by the British government in its Green Paper published in the spring of 2002. The British report, however, casts the mandate for its proposed Scientific Advisory Panel as reviewing changes in the life sciences and addressing “their implications for the [Biological Weapons] Convention and the measures to strengthen

⁵ Stephen Block, “Living Nightmares: Biological Warfare Threats Enabled by Molecular Biology,” in *The New Terror: The Growing Threat of Chemical and Biological Weapons*, edited by Sidney Drell, Abraham Sofaer, and George Wilson (Stanford: Hoover Press, 1999).

it.”⁶ The British proposal is an example of the propensity to define the critical task in terms of strengthening the BWC rather than countering the biological security challenge. Its focus, therefore, is misdirected. It is more important to understand how advancing life sciences and associated technologies shape the future threat than to look only at how they impact on the treaty. Moreover, because any such evaluation should also include an assessment of how new science and technology could help deal with the threat, taking a broader approach than the one London suggests would encompass a wider range of response opportunities that could be missed if attention was given only to strengthening the BWC. This does not mean that the implications of scientific and technological developments on the treaty should not be part of the analysis. They should be included, but as part of a more extensive analysis, and not as the sole or even most important focus.

Policy makers might be reluctant to pursue this measure on an official basis, especially if the exercise was open to any state party to the BWC. The concern, of course, is that it would provide useful information to those pursuing BW capabilities and suggest pointers for directing their research and development programs. This concern illustrates the benefits of an approach that is not tied to a Geneva-oriented, BWC-based process. An ad hoc group of countries might be organized to do such a study based on advanced scientific capabilities. While most of the participants would be from developing countries, other key states that are taking a lead in biotechnology, such as India, Singapore, and Brazil, could be included, as could states whose involvement would be advantageous for political purposes, such as Argentina or South Africa. If political reluctance is still too great, such an effort might be organized through cooperation among national scientific academies or a “Pugwash-style” enterprise.

Impact Assessments

In addition to better threat, risk, and scientific assessments, **a useful contribution to the intellectual infrastructure would come from elaboration of alternative measures of the impact of breaches of biological security.** Developing such measures could contribute to a better, and more widely shared, view among policy makers of just how serious biological risks and threats are. They could also foster a better appreciation of the full range of how such capabilities could be used.

As already noted, the most obvious measure of impact is casualties, which is useful because it deals in things that can be counted. But the level of casualties is a useful indicator of impact only if the goal of using biological weapons is to kill people. If killing people is a means to some other objective, such as disrupting military operations or inciting widespread public panic, then casualty levels are at best an indirect indicator of the utility biological weapons. In some cases, killing people may be neither the objective nor the outcome. The economic costs of biological weapons use is probably the next easiest impact to measure, again because they are quantifiable. Models can be

⁶ “Strengthening the Biological and Toxin Weapons Convention: Countering the Threat of Biological Weapons,” Presented to Parliament by the Secretary of State for Foreign and Commonwealth Affairs, April 2002, p. 14.

developed, for example, that assess the costs of various attack scenarios against agricultural targets or business operations.

A particularly helpful impact metric would address the psychological effect of biological weapons threats and use under a variety of conditions. Biological weapons seem to be particularly distressing to people, perhaps because of their horror at the prospect of an unpleasant death from an infectious disease or perhaps because biological weapons are viewed as a result of manipulating nature. Whatever the reason, better understanding of the potential psychological impact of biological weapons use could have three important benefits. First, it would help identify important response measures that could be put into place to deal with an attack if it occurs. Second, it would provide direction for public education efforts prior to any incident. Third, it might shed light on how the public assesses and will respond to other risks emanating from developments in the life sciences. Many of the broad public concerns about the implications of such things as cloning and eugenics derive from a fear, as the *Economist* put it, of “fooling around with nature.” Biological weapons now fall into the same category of anxieties, and understanding better the psychological impact in the BW context might open up interesting options for dealing with other risks as well.

Urging the development of better metrics for assessing the impact of breaches of biological security is not to expect a high degree of precision or a predictive capability. Casualties or economic costs are attractive metrics because they can be quantified. Other results do not lend themselves to numerical representation. Working on better impact assessment methodologies, however, would yield yet another set of tools for understanding the nature of the problem and pointing toward potentially useful responses.

Ethical Awareness

A fifth component of an intellectual infrastructure to support biological security must be ethical awareness. The goal of complete delegitimization leaves little room for moral ambiguity regarding biological weapons. **Because of the broader scope to biological security risks, however, ethical considerations in relation to the tradeoffs between security and other (especially humanitarian) priorities must be confronted.**

From the beginning of the nuclear age, and with the active participation of Einstein himself, physicists understood they had to think about the negative consequences of atomic power in order to avoid the catastrophic consequences of the knowledge they had uncovered. That recognition has been lacking in the life sciences community. Their single-minded focus on the good they were trying to do for humanity or scientific discovery for its own sake too often blinded life scientists to the risks that stood alongside the benefits they were seeking. That must change, and it is beginning to do so. Codes of conduct, peer reviews and panels, defining appropriate restrictions in scientific research are all ways in which the scientific community can contribute to an environment that does everything possible to foster the apposite use of the life sciences in the service of public safety and security. The more that is done by the scientific community in this area on an international basis, the richer that environment will be.

Infrastructure is defined as the “underlying foundation or basic framework (as of a system)” or the “resources required for an activity.” Physical infrastructure makes a particular way of life possible in a given natural environment. In the same way, a new conceptual and policy environment within which to address biological security requires an intellectual infrastructure. The components of such an infrastructure discussed here – better threat assessment methodologies, risk assessments based on cost-benefit analyses, future-oriented scientific evaluations, development of impact metrics, and enhanced ethical awareness – are obviously not exhaustive. Other components are also needed. But these are all important because they address some of the most basic needs on which other capabilities can hang, including arms control. Some hope should be taken from the nuclear experience. It was not until after the elaboration of that intellectual infrastructure that breakthroughs in nuclear arms control became possible. Pushing for a protocol to the BWC put the cart before the horse. We must be sure we are thinking about the problem and the potential solutions in the right way before the best routes for dealing with it can be determined. Developing these analytical tools should provide a means for enhancing all response options, including, eventually, arms control.

New Partnerships

Developing an intellectual infrastructure to support a conceptual and policy environment that stresses the proper role of the life sciences in the service of safety and security requires contributions from many more actors than the diplomats in Geneva or government policy makers and bureaucrats in national capitals. Some of these important actors have not traditionally been involved with questions of biological security in any significant way. They must become so now.

The Scientific Community

The important role of the scientific community has already been mentioned. Indeed, active participation and leadership of the scientific community will be indispensable. In some countries, scientists are under intense pressure to develop biological weapons. One way to help them resist is to build a strong international scientific presence on these issues with a strong and self-conscious ethic that constantly reinforces the illegitimacy of any biological weapons option.

Scientists can also make valuable direct contributions to enhancing biological security. Their discoveries will be the catalyst for improvements – sometimes dramatic – in defense capabilities in such areas as reliable and timely detectors as well as in effective medical treatments. Such gains, however, will require overcoming a traditional reluctance to conducting security-related life sciences research. While attitudes within the life sciences community appear to be changing in this regard, they still have a ways to go to provide the strong leadership and sustained involvement that will be needed.

Industry

Another key player is the biotechnology and pharmaceutical industry. Industry increasingly realizes that growing public and government concern over developments in biotechnology requires action on industry's part. While governments have a role to play in setting the regulatory framework, national approaches to the regulation of biotechnology will be varied and patchy. Furthermore, due to the rapid rate of technological advance in the biotechnology sphere, governments are often too slow in adjusting to the realities and potential threats that such developments create. The lessons from the largely unsuccessful government attempts to regulate the information technology industry are instructive. The challenge to industry, then, is how to engage on issues of public safety and security to take full account of legitimate security concerns without harming innovation and inhibiting efforts to exploit scientific and technological advances for their many benefits.

Given how the biotechnology industry is developing, any effort it undertakes in this regard should be an international one. The industry is inevitably going to be faced with increasing government efforts at regulation and legitimate public concerns. Cooperation internationally to gain a proper understanding of the wide variety of national legislation and regulations as well as to make an impact on any international regulations that might be contemplated would obviously be beneficial. Also, industry would gain from an international exchanges on safety and security measures in the operation of their facilities so that standards could be raised worldwide.

These considerations suggest that the time may be right to encourage the growth of international biotechnology industry cooperation on matters of public safety and security. This could be done through the establishment of a global enterprise that would link together biotechnology and pharmaceutical companies from around the world in a voluntary association that makes clear the advantages of national and international cooperation. This organization could also encourage cooperation by private industry with governments and international organizations such as the World Health Organization (WHO), to help ensure a safe and secure environment in which the industry and public can reap the full benefits offered by advancing science and technology.⁷ Such an entity would make a particularly important contribution if it could become a forum at which government and industry participants examine their joint concerns relating to the public safety and security agenda and share ideas on the best ways to respond to those concerns.

The Bush administration has proposed that countries develop and adopt a code of conduct for scientists working with pathogenic microorganisms, possibly building on existing ethical codes. The administration also urged countries both to adopt and implement strict regulations for access to particularly dangerous microorganisms,

⁷ The feasibility of such an international organization is currently being examined in a project being conducted jointly by the Chemical and Biological Arms Control Institute and the International Institute for Strategic Studies – US. A report providing conclusions and recommendations will be published in early 2003.

including regulations governing domestic and international transfers, and to sensitize scientists to the risk of genetic engineering and to explore oversight of high-risk experiments.

These are all issues in which industry itself should play a major role rather than just leaving action to governments. On the code of conduct issue, for example, development of such a code is being pursued in a joint effort by U.S. and Swiss industry representatives with the intention of expanding participation in the effort to other countries once a draft version has been developed. This is only one example of how industry could develop a new relationship with governments to provide critical input to the public safety and security agenda.

The biotechnology and pharmaceutical industry is promoting science and technology that both holds enormous promise to benefit humanity and creates some potential risks. The former must be safeguarded and the latter managed. Industry leadership in shaping effective relationships with governments and the broader scientific community is a key to the success of doing so.

Cooperation and Assistance

The political problems associated with cooperation and assistance in the biological security realm have been discussed. With respect to the dispute over the future of export controls, the elimination of the Australia Group is a non-starter; it still has a useful role to play. Over the long-term, however, in light of rapidly advancing science and technology, one must ask whether governmental export controls in the biological area will be able to keep pace. Biotechnologists now have the capability to construct a pathogen from snips of protein they could collect from a variety of different sources.⁸ If the operational unit is now snippets of protein, what does controlling, or even regulating the trade in such materials mean?

Given these and similar trends, **Australia Group members should consider conducting a future-oriented examination to identify how changing science and technology will influence export controls.** The work of the proposed scientific panel conducting a net assessment of scientific and technological trends would provide the baseline for this evaluation but the specific focus of this proposed evaluation would be the efficacy of regulation of international exchanges and the long-term demands of managing technology diffusion.

Casting the issue as one of managing technology diffusion rather than controlling exports has important policy implications. First, it acknowledges that the process of diffusion is already well apace. Second, it changes the balance in the analysis from transferring things (material and equipment) to transferring knowledge. Nonproliferation export control regimes – including the Australia Group – have their origin in the Cold War’s priority to nuclear weapons, for which access to fissile material is the critical

⁸ This point was made by the CEO of a major biotechnology company in the United Kingdom in an interview with the author.

factor.⁹ The commercial, medical, or agricultural ubiquity of the material and equipment to develop at least a limited biological weapons capability makes technical know-how the essential element. In a world in which yesterday's Nobel Prize winning research is tomorrow's high school science fair project, it is obviously not realistic to suggest that flows of knowledge can be strictly controlled, especially with so many means of direct and global communications.

It is not the knowledge per se that is important, however, but the people with that knowledge. Greater attention should be given to what people do with the knowledge they acquire, especially in academic and industry settings. Biological weapons scientists in places like Iraq received at least some of their training in the West. It is impractical, however, to try to track every foreign student or scientist studying or conducting research in the life sciences at western universities. No less difficult is restricting research. As the Patriot Act was being formulated, for example, the idea was offered of prohibiting foreign nationals from working with pathogenic agents listed by the CDC as of special concern for biological security. This idea, however, was a non-starter because it would have decimated the research programs at many universities and other research institutions. Despite the difficulties, some sensitivity to the issue of people involved in such research should be promoted.

People should also be a concern to industry. Competition within industry is fierce, and individuals are often employed with little or no checking of references, let alone a more stringent background check. It is conceivable that a dedicated terrorist or national operative could move from company to company acquiring skills and know-how from each one that together could represent a significant contribution to a biological weapons program.

Companies should not be in the business of conducting security clearances. But the distinction between doing national security work for the government that would require a clearance and non-government activities that do not is perhaps not as clear-cut as it was in the past. One argument throughout this report is the need for greater awareness of the security implications of current and future scientific and technological developments regardless of where they occur, and those outside the government orbit tend to be less sensitive to those implications. **Industry should seek to develop, therefore, a minimum personnel review procedure that could at least raise some caution flags about suspect individuals.** The process should be developed within industry itself, but at some point, coordination with the government could prove useful.

Beyond the issue of export controls and managing technology diffusion lie additional issues related to cooperation and assistance that must be taken into consideration in promoting the kind of environment suggested here. But any new approach to cooperation and assistance should be grounded in three realizations. First,

⁹ The Australia Group was created in response to chemical weapons use by Iraq in its war with Iran during the 1980s and recognition that Western states helped Iraq acquire the means to develop those capabilities. Nevertheless, the conceptual foundations for export controls date back earlier when the major focus was nuclear weapons and keeping materials from being acquired by the Soviet Union and its allies.

genuine cooperation and assistance with respect to the peaceful uses of the life sciences must be pursued on a track separate from a Geneva-based, security-oriented activity. The kind of process that allows non-aligned countries to draw linkages that are exploited for political purposes both diminishes what can be accomplished with respect to cooperation and undermines security initiatives. Second, all participants must recognize that challenges related to global health, such as infectious diseases have security implications beyond the biological weapons issue. They should also realize that health and security imperatives, including in the area of disease surveillance, can sometimes be competitive and difficult to manage.¹⁰ Third, whatever is done will cost money. For this reason, those measures that have dual use value should be emphasized.

The notion of strengthening global epidemiological surveillance has been a centerpiece in the thinking about cooperation and assistance. It is an idea that has been around a long time, and it should be pursued for health as well as security reasons. Despite its long-standing inclusion in thinking regarding Article X of the BWC, however, a number of issues about enhanced disease surveillance's contribution to security have not been as deeply analyzed as they should be, because operationalizing the notion of enhanced disease surveillance, especially to serve security goals, is not as easy as it is often assumed.

The first question is: what needs to be done? In the last several years, the World Health Organization has made significant improvements in its surveillance efforts, but much still needs to be done. Many disease surveillance systems already exist, public and private, broadly cast or focused on a specific disease. There is not yet a good appreciation of all of the existing systems and their relative effectiveness. More importantly, perhaps, how and how well they fit together are unanswered questions. **Conducting an inventory of existing disease surveillance capabilities, therefore, is a critical first step.**

Second, how will disease surveillance be used effectively to serve security interests? It is assumed that any new surveillance system will build on the current WHO system, and that is a smart thing to do. But it will not be as easy as expected to translate results from a system whose primary mission is directed to public health goals into a useful form to serve security interests. The WHO is fanatic about maintaining its political neutrality. It is the only way the organization can maintain its ability to get access in countries to investigate infectious disease outbreaks. WHO will not, and it should not be expected to make judgments regarding whether or not a particular outbreak is natural (although unusual) or deliberate, and it will certainly refuse to speculate as to what country might have been responsible for a deliberate outbreak. How then can one translate the information gained through better disease surveillance into a form meaningful for security? Because the UN Secretary General already has investigative powers in the event of alleged BW use, one route might be the UN's Department of Disarmament Affairs (DDA). In addition to the fact that the DDA has no expertise in global public health, however, the risks in going that route are politicization and

¹⁰ Jonathan Ban, *Health, Security, and U.S. Global Leadership*, Special Report 2, Chemical and Biological Arms Control Institute, 2001.

bureaucratization in a situation in which good scientifically based analysis is critical. **Closer attention must be given, therefore, to developing a means to translate public health information into a security context in a helpful way.**

Beyond improved disease surveillance cooperation and assistance may be enhanced in two other ways. **First, efforts should be made to get the private sector more involved. Internships, fellowship programs, and other activities in private industry that are oriented to the public safety and security agenda could be developed by industry to promote broader awareness of the implications of advancing science and technology. Second, some assistance efforts might focus on building capacity for bioterrorism preparedness and response.** This could be sensitive in terms of countries with whom such cooperation might be pursued, and those international efforts that have been undertaken have tended to focus on cooperation among developed countries. One example is the the G-7 plus Mexico health ministers developing a bioterrorism action plan. Some people might argue that bioterrorism is a greater risk to developed countries, but some developing nations also have reason to be concerned. Working with them on measures based on lessons learned and best practices that emerge from developed country programs – whether in health matters, law enforcement, or emergency response – might be a useful contribution in the assistance area.

Responding to Noncompliance

The world has changed considerably since Undersecretary Bolton placed the issue of noncompliance squarely on the agenda of the international community at the opening of the Fifth Review Conference in November 2001. In particular, the current confrontation with Iraq makes difficult any discussion of long-term, concrete approaches to dealing with noncompliance. This is because the outcome of the current crisis with Iraq will have a dramatic impact on what may or may not be possible in response to any future noncompliance. The possible outcomes range from putting preemption high on the agenda (if military action against Baghdad is successful) to essentially doing nothing (if, for example, the UN Security Council refuses to act and a U.S.-led coalition of like minded have to pay a high price for success). The case of Iraq today will set the parameters for action in the future. They may be quite broad or so narrow as to be negligible.

In many ways, Iraq is the easiest noncompliance situation. Saddam Hussein has nuclear, chemical, and biological weapons programs, and he has demonstrated a willingness to use them. He is in violation of the global norm against such weapons and stands in grave noncompliance with a range of commitments to the United Nations, including the many he made to abide by the terms of numerous Security Council resolutions. If the international community cannot mount a robust reaction in Iraq's case, then no one should expect the UN to react in the face of other arms control and nonproliferation violations in the future.

Few cases will have the clarity that exists with respect to Iraq. Ambiguity permeates the problem of determining compliance or non-compliance, whether it is in terms of commitments, programs, or even use. Because of the difficulty of finding definitive and convincing evidence that demonstrates intent, allegations about violations of BWC commitments are difficult to prove. It is generally recognized that gathering meaningful information on biological programs is one of the most difficult challenges confronting the intelligence community which makes it hard to know who is doing what with any precision. Even in terms of use, it is not clear that we would know if biological weapons were used. Allegations, for example, that the foot and mouth outbreak that destroyed Taiwan's swine market was a deliberate introduction are impossible to prove or disprove unambiguously.

Finding ways to reduce ambiguity, therefore, is one of the most important tasks in the area of dealing with noncompliance. It is also one of the most difficult. The intelligence challenges have already been mentioned. So too have the problems of translating information generated by disease into useful security terms. A third means of reducing ambiguity – enhanced forensics – presents formidable technological challenges.

The ambiguity that is likely to be associated with most cases of noncompliance is especially problematic because it reinforces the other major barrier to responding effectively, i.e., the lack of political will to take action. History suggests that the existence of a biological weapons program is not sufficient to prompt action or even commitments to act. In neither the case of Iraq nor the illicit Soviet program, nor in terms of allegations of other programs, no countries other than United States and the United Kingdom have been concerned enough to pursue an allegation robustly and over a sustained period of time. It is as if it is better not to know.

The hardest cases to promote a response will be those in which there is little if any hard evidence and no sense of immediate or severe threat. If no action is forthcoming in relatively easy cases like Iraq, there is little prospect for action on tougher cases where the evidence will almost certainly be less clear. In such cases, ambiguity in the evidence provides the justification for non-action.

It may be, then, that it is only with respect to a scenario involving BW use that there is chance that the international community will act. Perhaps BW use represents a red line whose crossing no one can ignore. But even in case of use, action should not be taken for granted. It is for this reason that the idea has been offered to seek a pre-commitment from major powers – the Security Council permanent members, for example – to take action in the face of biological weapons use.¹¹ Such a commitment would embody the principles that any user of BW would not benefit from that use in any way and that those responsible for use would be held accountable. As this concept has emerged, a commitment to potential regime change was conceived as part of the action that great powers could impose on a BW user. The current debate over Iraq raises serious doubts that a policy regime change could be so incorporated into acceptable policy

¹¹ This idea has been most completely developed by Paul Schulte, formerly of the UK Ministry of Defence, as well as Lewis Dunn and Sir Michael Quinlan.

options to which a group like the P-5 would pre-commit. Indeed, it remains to be seen whether a sufficient consensus can be forged in the Security Council on Iraq to suggest that any agreement is possible among Security Council members regarding nonproliferation and noncompliance, let alone this idea of securing a pre-commitment to action in the face of BW use.

The issue of responding to noncompliance effectively, therefore, remains a question searching for an answer in a situation in which previous answers have not been successful. In the same way that people can criticize the United States because its policies of containment and isolation of states of concern has not yielded benefits, so too can one argue that the European approach of engaging those states has not provided much in terms of security. What security gains were achieved, for example, from establishing diplomatic relations with North Korea? The prospect of being next on the list after Iraq seems to have done more to move Pyongyang than any diplomatic initiatives. The same might be argued about Iraq. It seems that Baghdad was willing to agree to the return of inspectors only after the Bush administration made it clear that military action was a very real option. The fact of the matter is that neither a containment nor an engagement approach has made a significant contribution to promoting compliance. The Iraq case has cast the options in terms of UN inspections or military action. Both options have severe shortcomings. It is incumbent, therefore, to try to promote new thinking and new approaches that neither let those in noncompliance off the hook nor lets them hide behind diplomatic processes. Identifying those approaches must await the playing out of the situation with Iraq. Only then will it become clear as to what, if anything, is possible.

CONCLUSION

The security, scientific, technological, and political factors shaping the evolving environment within which the fight against biological weapons must be waged are creating a complex milieu that includes difficult barriers to building an effective response. Old ways of doing business, therefore, will not suffice. Novel creative, coherent, and collaborative approaches must be pursued. Developing a successful approach requires thinking differently about the problem. The challenge, as mentioned at the outset, is not about arms control. In many ways, it is not even about weapons as we traditionally think about them. At its core, the biological security challenge is about the misuse of science and technology in a complex world whose hallmark is uncertainty about the future and the need to manage risks in the present. Confronting this challenge will not be easy, and it will not be successful overnight. Rather the elements of a new approach must be put into place now, doing what is possible, building where appropriate on what already exists, and creating the partnerships among critical stakeholders whose involvement will be crucial for long-term success.